

interpretation of any of applicants' claims. Instead, such discussed differences are provided to help the U.S. Patent and Trademark Office better appreciate important claim distinctions discussed thereafter.

II. Summaries

A. Summary of the Present Invention

The present invention is directed to a method, system, and computer product for synchronizing a database that is either stored on a client computer, on a client computer and a server computer, or on a plurality of client computers and a server computer. Users are able to choose between different computer configurations for accessing and manipulating data in the database and using the database application. For example, a user may access the database application and modify the database from two or more client computers. In this instance, the database is permanently stored on the server computer so that client computers may obtain the most recent version of the database. Alternatively, a user may access the database application and modify the database only from a client computer. In this instance, permanent storage of the database on the server computer is not necessary.

The method and system of the present invention also allows updates to databases while minimizing the amount of data transferred. More specifically, the present invention employs time relationships to reduce the amount of data transferred. An analysis of the time relationship is performed on data stored in databases to determine the type of download that is executed. For example, the server downloads a database file to the client, if the last access time of the client database is earlier than the creation time of the server database. Alternatively, the server selectively downloads individual data objects from the server database to the client database, if the last access time of the client database is not earlier than the creation time of the server database. In this way, the method and system of the present invention allow users to access and

manipulate data stored in databases located on client and server computers while reducing the amount of data transferred during synchronization.

Another claimed aspect of the present invention provides a method for initializing duplicate databases. In one embodiment, the system deletes a server computer database if the server contains a database and if a user-generated command dictates that the server database be deleted. In addition, the system copies a client computer database to the server if the user-generated command dictates that the database be copied. This method prepares duplicate databases for a synchronization process, such as the synchronization process described above.

B. Summary of U.S. Patent No. 6,226,650, Issued to Mahajan et al.

Mahajan et al. purportedly discloses a system that reduces the storage and processing required for the purpose of improving the ability of a server to handle more client computers. More specifically, Mahajan et al. purportedly discloses a system in which databases located on server and client computers are synchronized using a method that includes dividing data that will be distributed from a server database to a client database into groups in which a group defines which data needs to be updated on a client computer. In this regard, client computers are associated with selected groups and when a client connects to the server, the modification files associated with the group are transmitted to the client or clients associated with the group. As a result, the Mahajan et al. system improves the ability of a database system to process and handle a large number of client computers than was capable in previously known systems. Stated differently, by grouping the data within the database into data groups and by associating individual modification files with each group, the overhead associated with managing a database system is decreased thereby improving the scalability of the database system.

C. Summary of U.S. Patent No. 5,970,502, Issued to Salkewicz et al.

Salkewicz et al. purportedly discloses a system and method for synchronizing databases. (Salkewicz et al., Col. 1, lines 7-10). More specifically, Salkewicz et al. discloses a system and method for synchronizing database copies existing on server computers connected to a network. Storing database copies on a plurality of servers distributes the load of network connections between multiple computers. However, when multiple copies of a database exist, data integrity is more difficult to maintain as redundant copies must be kept identical. To maintain data integrity, the distributed servers communicate with one another and exchange information regarding updates to the database. Also, distributed locking schemes are employed to provide a single server with access to records when modifications are necessary. (Salkewicz et al., Col. 1, lines 30-46.)

In one embodiment, Salkewicz et al. discloses a method of selectively updating a database copy on a remote server. In making updates, the source database is divided into a plurality of segments, which contain the last modification time processed for each record. The destination server receives the segments and compares the last modification time of the source database with the destination database. If the source database has a last modification time that is earlier than or equal to the time in the destination database, the received segment is ignored. If the source database has a last modification time that is later than the destination database, the record is updated.

III. Rejection of Claims 1 and 8 Under 35 U.S.C. § 103(a)

The Office Action rejected Claims 1 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Mahajan et al. in view of Salkewicz et al. The Office Action asserts that Mahajan et al. and Salkewicz et al. disclose each of the elements of applicants' claims and that it would have been obvious to a person of ordinary skill in the art to combine the teachings of the

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cited references at the time this invention was made. Applicants respectfully disagree. As described in more detail below, the cited references fail to disclose or suggest certain elements of the independent and dependent claims. Moreover, applicants submit that it would not have been obvious to combine the teachings of the cited reference at the time the invention was made.

A. Claims 1 and 8

Claim 1 recites the following:

A method for dynamically synchronizing a duplicated database suitable for storage on both a server computer and a client computer, wherein the client computer database comprises a last server access time and a plurality of data objects and the server computer database comprises a creation time and a plurality of data objects, said method comprising:

- downloading the server computer database to the client computer, if the client computer database last server access time indicates a time that is earlier than a time indicated by the creation time of the server computer database;

- selectively downloading data objects stored in the server computer database to the client computer database, if the client computer database last server access time indicates a time that is not earlier than a time indicated by the creation time of the server computer database;

- in response to receiving a user-generated command, configuring the database either for storage on the client computer or for storage on both the client computer and the server computer;

- deleting the server computer database if the server computer contains a database and if the user-generated command dictates that the server computer database be deleted; and

- copying the client computer database to the server computer, if the user-generated command dictates that the client computer database be copied to the server computer.

The Office Action asserts that Mahajan et al. discloses a method in a computer system for selectively downloading data objects stored on the server computer database to the client computer database if the client computer database last server access time indicates a time that is not earlier than a time indicated by the creation time of the server computer database. The Office Action then asserts that Mahajan et al. discloses a system that, in response to receiving a user generated command, configures a database either for storage on the client computer or for

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storage on both the client computer and the server computer. Finally, the Office Action asserts that Claim 1 is obvious when considering the teachings of Mahajan et al. in view of Salkewicz et al. For the following reasons, applicants respectfully disagree.

Claim 1 of the present application, recites "in response to receiving a user-generated command, configuring the database either for storage on the client computer or for storage on both the client computer and the server computer." A user of the present invention may choose between different configurations for accessing and manipulating a database. For example, a user may modify the database from two or more client computers. In this instance, the database is permanently stored on the server computer so that client computers may obtain the most recent version of the database. Alternatively, a user may modify the database from a single client computer. In this instance, permanent storage of the database on the server computer is not desirable because server computers connected to a network may be vulnerable to malicious computer users. Stated differently, storing a database on a server computer is a greater security concern because server computers must remain connected to a network to perform their functions. The present invention allows users to implement a database configuration that stores a database only on a client computer to minimize potential security threats; or as stated in Claim 1, the present invention supports "configuring the database **either for storage on the client computer** or for storage on both the client computer and the server computer." [Emphasis added.]

The Office Action asserts that Mahajan et al. discloses configuring a database either for storage on a client computer or for storage on both a client computer and a server computer in response to obtaining a user generated command. (Office Action at page 3.) In support of that proposition, the Office Action cites Col. 6, lines 1-22; Col. 2, lines 6-54; and Figure 2 of Mahajan et al. As stated in the Office Action, the cited portions of Mahajan et al. teach

"database management configuration, e.g., delete, copy, etc." (Office Action at page 3.) However, "configuring the database either for storage on the client computer or for storage on both the client computer and the server computer," as recited in Claim 1 of the present invention is not equivalent to performing "database management configuration, e.g., delete, copy, etc." In this respect, the "database management configuration" performed by the Mahajan et al. computer system includes creation of "modification files" that are stored on the server computer for transmittal to the client computer system. As stated in Mahajan et al.:

multiple modification files that are associated with selected groups of data are transferred to the client computer system. The client computer system evaluates each of the modification files to determine which updates should be deleted, reorganized, or merged to properly synchronize, as explained below in more detail, the local database with the server database.

(Mahajan et al., Col. 6, lines 11-16.)

As stated above, in the Mahajan et al. system, client computers connected to a server are organized into groups. Moreover, modification files are maintained on the server computer for the purpose of communicating with the different groups of client computers regarding which updates need to be committed to their local databases. For some client computers, even though changes have been committed to the database maintained on the server computer, those changes do not need to be reflected on the local copy of the database. As a result, the "portions of data used at the client computer system may be considered as a subset of data of the server database and are stored on a local database. The local database contains information relevant to processes of the client computer system." (Mahajan et al. Col. 5, lines 38-43.) This description provided in Mahajan et al. in which a client computer only maintains a "subset" of data from the complete version of the database that is on the server computer indicates that a configuration in which a database is only stored on the client computer is not disclosed in Mahajan et al. Stated differently, in the Mahajan et al. system only the complete version of the database is maintained

on the server computer. It follows that Mahajan et al. does not disclose a system in which a complete version of the database may only be stored on a client computer for security reasons. In the context of the claim language, Mahajan et al. does not disclose a system for "configuring the database either **for storage on the client computer** or for storage on both the client computer and the server computer." Moreover, the recited element in Claim 1, is not merely "database management configuration." Instead, as stated in the present application, "[i]n accordance with another aspect of the present invention, the synchronization routine allows users to store a database solely on client computers, thereby providing added data storage security" (Present application at page 5.) Since aspects of the present invention may be included in a financial Web site, such as the one provided by Microsoft Corporation at the web address MONEYCENTRAL.MSN.COM (see present application at page 2), allowing users to configure a database in a secure manner so that the database is only stored on a client computer associated with the user, is not merely "database management configuration." Therefore, applicants respectfully submit that the database management configuration disclosed in Mahajan et al. does not suggest a method of providing two options to the user, namely, configuring the database either to be (1) "stored on the client computer" or (2) "for storage on both the client computer and the server computer."

Claim 1 of the present application, recites "selectively downloading data objects stored on the server computer database to the client computer database, if the client computer database last server access time indicates a time that is not earlier than a time indicated by the creation time of the server computer database." The Office Action asserts that Mahajan et al. discloses a system that selectively downloads data objects if the server access time indicates a time that is not earlier than the time indicated by the creation time of the server computer database. (Office Action at page 3.) In support of that proposition, the Office Action cites block 512 described

with reference to Figure 5A of Mahajan et al. The description provided in Mahajan et al. at block 512 states:

at step 512, the modification files 86 are transmitted to the requesting client computer 16. At step 516, the client computer system 16 begins an analysis of the modification files 400 to determine what data from the modification file 86 should be filtered, merge, deleted or otherwise modified.

(Mahajan et al., Col. 10, lines 24-29.)

Applicants are unable to find any reference in Mahajan et al. to a process of selectively downloading data objects based on the last instance when a client computer accessed the server computer. More specifically, the description of the cited reference in Mahajan et al. does not disclose a system of "selectively downloading data objects stored in the server computer database to the client computer database, if the client computer database last server access time indicates a time that is not earlier than a time indicated by the creation time of the server computer database."

The description provided in Mahajan et al. indicates that the decision-making process for determining when to download data to a local database is entirely different than the decision-making process recited in Claim 1 of the present application, namely "selectively downloading data objects stored in the server computer database to the client computer database, if the client computer database last server access time indicates a time that is not earlier than a time indicated by the creation time of the server computer database." As mentioned previously, the Mahajan et al. system groups data items based on which local databases on client computer systems are required to maintain "up-to-date" information for the data item. Changes made on a client computer to a data item are uploaded for storage on the server computer where a "modification file" is used to track all of the changes made by a group of client computers. When a client computer system is being synchronized with the server, the client computer system evaluates

each of the modification files to determine which updates should be deleted, reorganized, or merged to properly synchronize the local database. More specifically, as stated in Mahajan et al.:

The database management system 100 may access the appropriate modification files that correspond to the data groups to which the client has access. **These modification files contain a sequence of transactions in sequence or operations that have occurred to the corresponding data groups.** The modification files 86 that correspond to the data groups to which the client has access are then transmitted to the client computer system 16c Unlike previously known ICDB systems, multiple modification files that are associated with selected groups of data are transferred to the client computer system.

(Mahajan et al. at Col. 6, lines 1-13.) [Emphasis added.]

Thus, the Mahajan et al. system tracks a sequence of operations (e.g., changes, modifications, and the like) that have been performed on a corresponding data item. Then, based on the sequence of operations as recorded in a modification file, the Mahajan et al. system determines which changes need to be reflected on a particular client computer. Applicants respectfully submit that determining which changes need to be downloaded to a client computer based on a sequence of transactions that are recorded in a modification file is not equivalent to downloading data objects based on a server access time. More specifically, the cited portions of Mahajan et al. in the Office Action do not disclose a system of selectively downloading data objects "if the client computer database last server access time indicates a time that is not earlier than a time indicated by the creation time of the server computer database." Instead, Mahajan et al. identifies the data that will be downloaded to client computer based on a sequence of operations rather than the last server access time.

For at least the above-mentioned reasons, applicants respectfully submit that the Office Action has not established a *prima facie* case of obviousness with respect to Claim 1 and

respectfully request that the rejection of Claim 1 under 35 U.S.C. § 103(a) be withdrawn and Claim 1 allowed.

Applicants respectfully submit that independent Claim 8 is also in condition for allowance. Like Claim 1, Claim 8 recites "in response to receiving a user-generated command, configuring the database either for storage on the client computer or for storage on both the client computer and the server computer." As mentioned above, Mahajan et al. fails to disclose a database configuration where the database may be stored on a computer that is not permanently connected to a network. Also, like Claim 1, Claim 8 recites "selectively downloading data objects stored in the server computer database to the client computer database, if the client computer database indicates a last server access time that is not earlier than a time by the creation time of the server computer database." As stated above, Mahajan et al. fails to disclose a method that determines when to download data based on a server access time.

For at least the above-mentioned reasons, applicants respectfully submit that the Office Action has not established a *prima facie* case for a Section 103 rejection of Claim 8 and respectfully request that the rejection of Claim 8 be withdrawn and this claim allowed.

B. Claims 2-7 and 9-15

Since Claims 2-5 depend from Claim 1, and Claims 6 and 7 are, respectively, computer-readable medium and multiple dependent apparatus claims that depend from Claims 1-5, the analysis applied to Claim 1 also applies to these claims. Therefore, applicants respectfully submit that Claims 2-7 are in condition for allowance for the same reasons as Claim 1. Further, applicants submit that the dependent claims are patentable for additional reasons described below.

Since Claims 9-13 depend from Claim 8, and Claims 14-15 are, respectively, computer-readable medium and multiple dependent apparatus claims that depend from Claims 8-13, the

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analysis applied to Claim 8 also applies to these claims. Therefore, applicants respectfully submit that Claims 9-15 are in condition for allowance for the same reasons as Claim 8. Further, applicants submit that the dependent claims are patentable for additional reasons described below.

Claims 2 and 9 add the additional recitation of "updating the last server access time stored in the client computer database, wherein the updated last server access time corresponds to a clock time maintained by the server computer." The Office Action asserts that Mahajan et al. teaches updating the last server access time stored in the client computer database, wherein the updated last server access time corresponds to a clock time maintained by the server computer. As discussed above, Mahajan et al. updates local databases on client computers based on the groupings rather than a server access time. Accordingly, the cited reference fails to teach or suggest the additional element recited in Claims 2 and 9. Thus applicants assert that these claims are also allowable for this reason.

Claims 3 and 10 add the recitation of "transmitting, from the client computer to the server computer, the last server access time stored on the client computer database." The Office Action asserts that Mahajan et al. teaches transmitting, from the client computer to the server computer, the last server access time stored on the client computer database. However, as described above, Mahajan et al. does not disclose logic for determining when to transmit data based on an access times. Instead, the logic for determining whether to update data on a local database is based on an analysis of sequences of actions that are recorded in a modification file. Accordingly, the cited reference fails to teach or suggest the additional element recited in Claims 3 and 10. Thus, thus applicants assert that these claims are also allowable for this reason.

Claims 4 and 11 add the recitation of "determining if the last server access time of one data object stored in the server computer database indicates a time later than a time indicated by

the client computer database last server access time." The Office Action asserts that Mahajan et al. teaches determining if the last server access time of one data object stored in the server computer database indicates a time later than a time indicated by the client computer database last server access time. However, as described above, Mahajan et al. does not disclose logic for determining when to update data in a local database based on access times. Instead, the logic for determining whether to update data on a local database is based on an analysis of a sequence of actions that are tracked in a modification file. Accordingly, the cited reference fails to teach or suggest the additional element recited in Claim 4 and 11. Thus, these claims are submitted to be allowable for this additional reason.

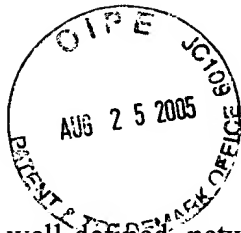
Claims 5, 12, and 13 add the recitation of "determining if the client computer database last server access time is within a predetermined period of the time from a clock time maintained by the server computer; and downloading the server computer database to the client computer, if the client computer database last server access time is not within a predetermined period of time from a clock time maintained by the server computer." The Office Action asserts that Mahajan et al. teaches the recited element and cites Col. 2, lines 6-27, and Col. 6, lines 1-22, of Mahajan et al. in support of that proposition. The predetermined time period referenced in the cited sections of Mahajan et al. is used to "verify the order of the change records to determine whether all change records for a broadcast have been received and correctly used to update the remote replica database." (Mahajan et al. at Col. 2, lines 24-26.) Applicants submit that using a clock time to determine whether to download the server computer database to the client computer as recited in the present application is not equivalent to using a predetermined time period to determine whether records have been received and used to update a database. Accordingly, the cited reference fails to teach or suggest the additional element recited in Claim 5, 12, and 13. Thus these claims are submitted to be allowable for this additional reason.

C. Claims 32-36

Since Claims 32-34 depend from Claim 1, the analysis applied to Claim 1 also applies to these claims. Therefore, applicants respectfully submit that Claims 32-36 are in condition for allowance for the same reasons as Claim 1. Further, applicants submit that the dependent claims are patentable for additional reasons described below. Moreover, since Claims 35-36 depend from Claim 8, the analysis applied to Claim 8 also applies to these claims. Therefore, applicants respectfully submit that Claims 35-36 are in condition for allowance for the same reasons as Claim 8. Further, applicants submit that the dependent claims are patentable for additional reasons described below.

Claim 32 adds the additional recitation of "deleting the client computer database if data objects have not been transmitted to the client computer system within a predetermined period of time and if the server computer contains the database." As described previously, references to a predetermined period of time as used in Mahajan et al. is not described in the context of determining whether a database will be transmitted to a remote computer. Accordingly, the cited reference fails to teach or suggest the additional element recited in Claim 32.

Claim 33 adds the additional recitation of "wherein the server computer communicates with the client computer using a Web server application." The Office Action asserts that Mahajan et al. teaches the recited element and sites Col. 4, lines 44-67, in support of that proposition. The referenced sections of Mahajan et al. indicate that the server and client computers communicate via a network and that the server computer maintains "applications and a server database 15d that are accessed by client computer systems 16 via intermittent connections." (Mahajan et al. at Col. 3, lines 51-53.) However, as described above, a server that implements the present invention may be configured to operate via a financial services Web site. In this regard, the server executes a Web server application program that allows computers to



communicate via well-defined network protocols such as HTTP. Applicants submit that performing operations in the context of a Web server application is different from other possible types of network applications that may be used by the Mahajan et al. system to communicate over a network. Thus, applicants submit that Claim 33 is also allowable for this reason.

CONCLUSION

In view of the remarks above, applicants respectfully submit that the present application is in condition for allowance. Reconsideration and reexamination of the application and allowance of the claims at an early date are solicited. If the Examiner has any questions or comments concerning this matter, the Examiner is invited to contact the applicants' undersigned attorney at the number below.

Respectfully submitted,

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